Harmonic Mean:

Harmonic mean is a numerical average and it is calculated by dividing the number of observations by the sum of reciprocal of each observation in the series.

Thus the Harmonic Mean is the reciprocal of the Arithmetic Mean of the reciprocals.

If there are two values in the series x1 and x2, then its Harmonic Mean is given by

H.M.
$$=\frac{2}{\frac{1}{x_1}+\frac{1}{x_2}}$$

• If x1, x2, x3, ..., xn are the values of the observations in the series, then its Harmonic Mean is given by

H.M. =
$$\frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \frac{1}{x_3} + \dots + \frac{1}{x_n}}$$

If $x_1, x_2, x_3, \ldots, x_n$ are the values of the observations in the series with frequencies $f_1, f_2, f_3, \ldots, f_n$, then its Harmonic Mean is given by

H.M. =
$$\frac{f_1 + f_2 + f_3 + \dots + f_n}{\frac{f_1}{x_1} + \frac{f_2}{x_2} + \frac{f_3}{x_3} + \dots + \frac{f_n}{x_n}} = \frac{\sum f_i}{\sum \frac{f_i}{x_i}}$$

Example : Find the Harmonic Mean of following

• 3,5

Soln: By formula, H.M. = 1+2 Soln: By formula, H.M. =
$$\frac{2}{\frac{1}{2} \frac{1}{4} \frac{1}{4} \frac{1}{8\pi}}$$

H.M. = $\frac{2}{\frac{1}{2} \frac{1}{4} \frac{1}{4}}$
H.M. = $\frac{2}{0.33+0.2}$
H.M. = 2/0.53
H.M. = 3.75
ii. 2, 4, 8
Soln: By formula, H.M. = $\frac{3}{\frac{1}{2} \frac{1}{4} \frac{1}{4\pi} \frac{1}{2} \frac{1}{4\pi}}$
H.M. = $\frac{3}{\frac{1}{2} \frac{1}{4} \frac{1}{4} \frac{1}{8}}$
H.M. = $3/(0.5+0.25+0.125)$
H.M. = $3/(0.5+5.25+0.125)$
H.M. = $3/(0.875)$

H.M. = 3.428

iii.

x	2	4	5
f	3	2	3
Soln: By formula, $H.M. = \frac{\sum f_i}{\sum_{k=1}^{T_i} x_i}$			
x	f	f/x	
2	3	1.5	
4	2	0.5	
5	3	0.6	
	8	2.6	
H.M. = 8/2.6			

H.M. = 3.077